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Description

TECHNICAL FIELD

[0001] The present invention relates to a die device which is attached to a suitable punch press such as a turret punch press so as to be used. More specifically, the invention relates to the die device, which is configured to have a punch body with a punch blade portion on its lower end is equipped with a punch guide so as to freely move up and down, and a disc-shaped stripper blade encircling the punch blade portion is detachably provided on a lower end of the punch guide and in which attachment/detachment and fixing of the stripper plate are easy and secure and height adjustment after repolishing of the punch blade portion is easy.

BACKGROUND ART

[0002] A prior example of the present invention includes Japanese Patent Application Laid-Open No. 10-113725 (1998) (prior example 1) and Japanese Patent Application Laid-Open No. 2000-288656 (prior example 2).

[0003] In the prior example 1 (Japanese Patent Application Laid-Open No. 10-113725 (1998)), a punch body having a punch blade portion on its lower end is provided in a cylindrical punch guide so as to be movable up and down, an oscillation locking piece having a latch portion being freely engaged with an engagement groove formed on an outer peripheral surface of a stripper plate on its lower end is provided on a lower end of the punch guide so as to freely oscillate to an inside-outside direction and be energized to an outside direction, and a turning ring, which has a locking piece pressuring portion for pressuring the oscillation locking piece to an inside direction so that the latch portion of the oscillation locking piece is engaged with the engagement groove of the stripper plate, is turnably provided to the lower end of the punch guide.

[0004] In the prior example 1, although the stripper plate can be attached to and detached from the lower end of the punch guide comparatively easily, the oscillation locking piece is made of a plate spring and it is occasionally broken at the attachment portion to the punch guide.

[0005] In addition, since the configuration is such that the turning ring is energized to a turning direction by a coil spring so that the latch portion of the oscillation locking piece is maintained to be engaged with the engagement groove of the stripper plate, a further improvement is desired in relation to that the turning ring occasionally turns against an energizing force of the coil spring due to vibration or the like at the time of a punching workpiece.

[0006] On the other hand, in the prior example 2 (Japanese Patent Application Laid-Open No. 2000-288656), in a configuration that a punch body having a punch blade portion on its lower end is provided into a cylindrical punch guide so as to be movable up and down, and a disc-shaped stripper plate encircling the punch blade portion is detachably provided to a lower end of the punch guide, a stopper ring is elastically mounted between a ring member fixed to an upper end of a punch driver fitted to an upper portion of the punch guide so as to be movable only up and down and an upper surface of the punch guide, a punch head member having a punch head on its upper end is fitted into the punch driver rotatively, and an external thread portion provided to an upper portion of the punch body is screwed into an internal thread portion provided to the punch head member so that an up-down position is adjustable.

[0007] In the above configuration, although the height adjustment after repolishing of the punch blade portion can be made easily, it is difficult to grasp a repolishing quantity of the punch blade portion, and the internal thread portion and the external thread portion are occasionally screwed firmly at the time of assembly after the repolishing. Thus, a further improvement is desired.

[0008] The present invention is devised in order to solve the above problems, and its first object is to provide a die device in which the height adjustment after the repolishing of the punch blade portion is easy.

[0009] The document JP-A-06000551 discloses a die device comprising a retainer collar being provided on an upper portion of a punch guide wherein a lower punch driver connected to a punch body is being fitted and supported into the punch guide so as to freely move up and down;
an upper punch driver inserted into the retainer collar so as to freely move up and down in a projecting manner;
wherein in the above configuration, the upper punch driver and an upper portion of the lower punch driver are screwed into each other in an up-down adjustable manner.

DISCLOSURE OF THE INVENTION

[0010] In order to achieve the above object, the present invention provides a die device as defined in claim 1.

[0011] According to the above configuration, when the retainer collar is rotated with respect to the punch guide so as to be turnable with respect to the punch guide, the punch driver piercing through the retainer collar movably up and down is rotated with respect to the punch guide. As a result, since the upper punch driver is screwed into the lower punch driver and rotates with respect to the lower punch provided on the punch guide movably up and down, the upper punch driver moves up and down with respect to the lower punch driver.

[0012] In other words, when the retainer collar freely turns with respect to the punch guide and is rotated with respect to the punch guide, the upper punch driver piercing the retainer collar movably up and down is rotated with respect to the punch guide. As a result, since the upper punch driver is screwed into the lower punch driver and is rotated with respect to the lower punch driver pro-

vided on the punch guide movably up and down, an up-down positional relationship between the upper punch driver and the lower punch driver is changed so that a punch height can be adjusted.

[0013] In the die device based on a second aspect depending from the first aspect, an engagement concave portion is provided in a vicinity of an outer peripheral portion of the retainer collar in a peripheral direction; and a latch member, which is maintained so as to be freely engaged with and disengaged from the engagement concave portion and normally in a engages state, is provided on the upper portion of the punch guide ii a diametrical direction so as to freely move.

[0014] In the above configuration, in a normal state, the latch member, which is provided on the upper portion of the punch guide movably to the center in the diametrical direction, is engaged with the engagement concave portion provided in the vicinity of the outer peripheral portion of the retainer collar in the peripheral direction, so that the retainer collar cannot rotate with respect to the punch guide. Meanwhile, when the latch member is moved to the inside in the diametrical direction so as to be disengaged from the engagement portion of the retainer collar, the retainer collar is enabled to rotate with respect to the punch guide.

[0015] In other words, in the normal state, the latch portion, which is provided on the upper portion of the punch guide movable to the center in the diametrical direction, is engaged with the engagement concave portion provided in the vicinity of the outer peripheral portion of the retainer collar in the peripheral direction, so that the retainer collar is disabled to rotate with respect to the punch guide. Meanwhile, when the punch height is adjusted, the latch member is moved to the inside in the diametrical direction so as to be disengaged from the engagement concave portion of the retainer collar, so that the retainer collar is enabled to rotate with respect to the punch guide. For this reason, when the retainer collar is rotated relatively with respect to the punch guide, the up-down positional relationship between the upper punch driver and the lower punch driver is easily adjusted so that the punch height can be adjusted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a sectional view showing a punch die as a die device of the present invention.

Fig. 2 is a sectional view showing an upper punch driver.

Fig. 3 is a sectional view showing a lower punch driver.

Fig. 4 is a sectional view showing a retainer collar.

Fig. 5 is a view in the direction of V in Fig. 4 and a bottom diagram of the retainer collar.

Fig. 6 is a plan view showing a punch guide.

Fig. 7 is a sectional view in the direction of VII-VII in Fig. 6.

THE BEST MODE FOR CARRYING OUT THE INVENTION

[0017] There will be explained below a die device of the present invention.

[0018] Fig. 1 is a sectional view showing a punch die P as the die device in accordance with the present invention. The punch die P can be mounted to an upper turret such as a turret punch press, and a punch body 33 having a punch blade portion 31 on its lower end is provided into a punch guide 29 so as to be movable up and down, and a lower punch driver 37 is mounted integrally to an upper side of the punch body 33 by a connecting bolt 35 in a normal state.

[0019] Here, a key 39 is mounted to a vicinity of a boundary between the punch body 33 and the lower punch driver 37 by bolts 41, and the punch body 33 and the lower punch driver 37 are supported integrally to the punch guide 29 so as not to rotate and be movable up and down.

[0020] With reference to Fig. 3, the lower punch driver 37 has a convex portion 37H, which is provided with a thread portion 43 on its outer peripheral surface, on an upper side of a disc-shaped lower portion 37L. An upper portion of the convex portion 37H is provided with a hole 45 into which a head portion 35H of the connecting bolt 35 is fitted, and the convex portion 37H and the lower portion 37L are provided with an inner diameter through hole 47 through which an underhead 35L of the connecting bolt 35 is put.

[0021] With reference to Figs. 1 and 2, a cylindrical upper punch driver 49 is provided so as to cover an outside of the convex portion 37H. An inside of the upper punch driver 49 has a tool hole 51 for inserting a tool for rotating the connecting bolt 35 thereinto, and a space 55 provided with a thread portion 53 on its inner peripheral surface for screwing the convex portion 37H. Here, an outer peripheral surf ace of the upper punch driver 49 is provided with a key groove 57 in an up-down direction. Moreover, a lower end of the upper punch driver 49 has a flange portion 59 protruding outward.

[0022] Therefore, the upper punch driver 49 is relatively rotated with respect to the lower punch driver 37, so that an up-down position of the upper punch driver 49 with respect to the lower punch driver 37 can be adjusted by functions of the thread portions 43 and 53.

[0023] With reference to Fig. 1, the lower portion 37L of the lower punch driver 37 is supported to an upper end of the punch guide 29 by a retaining portion 61 protruding inward so as to be incapable of ascending and capable of descending.

[0024] In addition, as shown in Fig. 6, four supporting pins 96 are provided to an outside of the upper end of the punch guide 29 so as to protrude. Elastic means such as a coil spring is provided between an upper surface of an upper turret of the turret punch press and the support-

ing pins 96, and the punch die P of the present invention is always energized upward.

[0025] A punch head 65 is mounted to an upper end surface of the upper punch driver 49 by a connecting bolt 63. A center of the punch head 65 is provided with a tool inserting hole 67 for rotating the connecting bolt 35.

[0026] Further, there will be explained below a configuration where the up-down position of the upper punch driver 49 with respect to the lower punch driver 37 is adjusted by the functions of the thread portions 43 and 53 of the lower punch driver 37 and the upper punch driver 49.

[0027] The punch guide 29 shown in Figs. 6 and 7 is in a state before assembly of the punch die P of the present invention. An upper end 29U of the punch guide 29 is formed with a horizontal hole 94 which extends to a horizontal direction. The horizontal hole 94 is opened to an outer surface of the punch guide 29. The other end of the horizontal hole 94 does not pierce an inside surface of the retaining portion 61 and is hollow just before the inside surface of the retaining portion 61.

[0028] Further, an approximately center portion of the horizontal hole 94 is formed with another vertical hole 75 which extends to a vertical direction. The horizontal hole 94 and the vertical hole 75 are connected with each other. As shown in Fig. 6, the vertical hole 75 has an opening 95 on an upper end of the vertical hole 75 so that it upper end is opened to an upper surface of the retaining portion 61.

[0029] The horizontal hole 94 is provided with a push button 69 which is movable to a diametrical direction (a left-right direction in Fig. 1). The push button 69 is pressured to be energized to an outer direction by an elastic member 71 such as a coil spring. The push button 69 is provided with a stopper pin 73 as a latch member which pierces the push button 69 up and down in a fitted state.

[0030] The stopper pin 73 can move to a direction R of the horizontal direction (the left-right direction in Fig. 1) inside the vertical hole 75. Further, an upper end of the stopper pin 73 pierces the opening 95 provided to the upper end of the vertical hole 75 upward and protrudes upward from the opening 95. The stopper pin 73 can move to the direction R inside the vertical hole 75, but since it abuts against an outside wall of the vertical hole 75 so as not to slip out of the vertical hole 75.

[0031] Next with reference to Figs. 1, 4 and 5, a configuration of a retainer collar 77 mounted into the upper portion of the punch guide 29 will be explained.

[0032] Arc shaped convex portions 80 are provided on a lower surface of the retainer collar 77 so as to protrude with equal gaps. In this embodiment, the ten convex portions 80 are formed. Moreover, engagement concave portions 81 are provided between the convex portions 80. Further, a peripheral groove 79 is provided inside the convex portions 80 on the lower surface of the retainer collar 77.

[0033] In other words, as shown in the drawings, the peripheral groove 79 is formed on the lower surface of the retainer collar 77, and its peripheral portion is provided with the ten engagement concave portions 81. When the engagement concave portions 81 and the peripheral groove 79 are formed, as a result the arc shaped convex portions 80 are formed to protrude on the lower surface of the retainer collar 77 with the equal gaps.

[0034] With reference to Fig. 4, the upper end of the stopper pin 73 is provided so as to be engaged with the peripheral groove 79 formed on the lower surface of the retainer collar 77 and a plurality of the engagement concave portions 81 formed on a peripheral direction of the outside of the peripheral groove 79 with a predetermined pitch alternatively. In a normal state as shown in Fig. 1, the push button 69 is pushed down to the outer direction by the function of the elastic member 71 so that the upper end of the stopper pin 73 is engaged with the engagement concave portion 81, and a fixed state is obtained in such a manner that rotation of the retainer collar 77 with respect to the punch guide 29 is inihibited.

[0035] With reference to Figs. 1, 6 and 7, the retaining portion 61 of the punch guide 29 is provided with three tapped holes 83 which pierce a radial direction with an interval of 120°, and setscrews 85 (see Fig. 1), for example, are screwed into the tapped holes 83 , respectively, so that the retaining portion 61 is freely engaged with and disengaged from a retaining groove 87 of the retainer collar 77.

[0036] In addition, a through hole 89 which pierces the retainer collar 77 to a diametrical direction is provided (see Figs. 4 and 5), and a spring pin 91 (see Fig. 1) which always protrudes to a center direction is provided on the through hole 89. Since the spring pin 91 is engaged with a key groove 57 (see Fig. 2) provided on the outer peripheral surface of the upper punch driver 49 in the up-down direction, the retainer collar 77 integrally rotates with the upper punch driver 49 and is movable to the up-down direction.

[0037] As shown in Fig. 1, a stopper spring 93 is provided between the punch head 65 and the retainer collar 77. Due to repulsion of the stopper spring 93, the upper punch driver 49 is energized upward via the punch head 65 so as to be disengaged from the retainer collar 77. However, since the flange portion 59 of the upper punch driver 49 is retained by the retainer collar 77 in an unascendable state, the upper punch driver 49 does not slip off. Namely, the upper punch driver 49 is made to be a unit by a combination of the retainer collar 77, the stripper spring 93, the punch head 65 and the connecting bolt 63. Due to this unit state, as mentioned later, an adjusting operation on punch height of the present invention is easily performed.

[0038] In the above configuration, when a striker 13 strikes the punch head 65, as shown in Fig. 1, while the stripper spring 93 is being shrank, the punch blade portion 31 is descended via the upper punch driver 49, the lower punch driver 37 and the punch body 33, and a punching workpiece is carried out on a workpiecepiece W by a cooperation of the die D.

[0039] Next, the punch height adjusting operation will be explained. Firstly in a state that the upper end of the stopper pin 73 protrudes upward from the opening 95 so as to be engaged with the engagement concave portion 81 of the retainer collar 77, the push button 69 is pushed to the direction R. When the push button 69 is pushed to the direction R against the energizing force of the elastic member 71, the upper end of the stopper pin 73 is disengaged from the engagement concave portion 81 so as to be located in a position of the inner peripheral groove 79. Namely, as shown in Fig. 5, the stopper pin 73 is moved to the direction R to be in a position shown as a stopper pin 73'.

[0040] In this state, the stopper pin 73 can run to a direction S or a direction T in the peripheral groove 74. Therefore, the punch guide 29 can rotate to the direction S or T. The lower punch driver 37 is in a state that it cannot rotate with respect to the punch guide 29 due to the function of the key 39, due to the rotation of the punch guide 29 to the direction S or T, the lower punch driver 37 as well as the punch guide 29 integrally rotates to the same direction.

[0041] Therefore, the upper punch driver 49 rotates relatively with respect to the lower punch driver 37, and the lower punch driver 37 moves up and down with respect to the upper punch driver 49 due to the function between the thread portion 53 provided on the inner peripheral surface of the upper punch driver 49 and the thread portion 43 provided on the convex portion 37H of the lower punch driver 37.

[0042] For example, in the case where the ten engagement concave portions 81 are provided on the outside of the peripheral groove 79, when being rotated to an adjacent engagement concave portion 81, the upper punch driver 49 rotates by 1 / 10 revolution with respect to the lower punch driver 37 , so that the lower punch driver 37 can be descended by 1/10 of the pitch of the thread portion 53 and the thread portion 43. Namely, the punch height can be adjusted so as to be higher by 1/10 of the pitch.

[0043] Here on the contrary to the above function, in a state that the push button 69 is maintained to be pushed, in other words, in a state that the upper end of the stopper pin 73 is disengaged from the engagement concave portion 81 so as to be located in the position of the inner peripheral groove 79, rotation of the punch guide 29 and the lower punch driver 37 is fixed, and the the upper punch driver 49, the retainer collar 77, the stripper spring 93, the punch head 65 and the connecting bolt 63 which form the unit as mentioned above are rotated to the direction S or T, so that the punch height can be adjusted.

[0044] When the up-down adjustment of the lower punch driver 37 with respect to the upper punch driver 49 is made and the pushing of the push button 69 is released, the push button 69 is moved to the outer direction by the energizing force of the elastic member 71, and the upper end of the stopper pin 73 is engaged with another engagement concave portion 81 so that the relative rotation of the retainer collar 77 is prevented.

[0045] From the above result, the push button 69 is pushed to the inner direction and the retainer collar 77 is rotated relatively with respect to the punch guide 29, so that the punch height can be adjusted easily.

[0046] Here, this invention is not limited to the above-mentioned first embodiment of the invention, and the invention can be carried out in another mode by suitable modification. Namely, the above-mentioned embodiment described the case where the ten engagement concave portions 81 are provided with the pitch of 36 °, but a number of the engagement concave portions 81 is arbitrary. An adjusting quantity of the punch height can be set by a number of the engagement concave portions 81 and the pitches of the thread portion 53 and the thread portion 43.

Claims

1. A die device comprising:

a retainer collar (77) being provided relatively on an upper portion of a punch guide (29) so as to be freely turned and fixed wherein a lower punch driver (37) connected to a punch body (33) is being fitted and supported into the punch guide so as to freely move up and down;
an upper punch driver (49) inserted into the retainer collar so as to freely move up and down in a projecting manner;
the retainer collar (77) integrally rotating with the upper punch driver (49);

wherein in the above configuration, the upper punch driver (49) and an upper portion (37H) of the lower punch driver are screwed into each other in an up-down adjustable manner.

2. The die device according to claim 1, wherein:

an engagement concave portion (81) is provided in a vicinity of an outer peripheral portion of the retainer collar (77) in a peripheral direction; and
a latch member (73), which is maintained so as to be freely engaged with and disengaged from the engagement concave portion (81) and normally in a engaged state, is provided on the upper portion of the punch guide (29) in a diametrical direction so as to freely move.

Patentansprüche

1. Stanzvorrichtung, umfassend:

einen Haltebund (77), der jeweilig auf einem

oberen Bereich einer Stanzführung (29) bereitgestellt ist, um frei gedreht und fixiert zu werden, wobei ein unterer Stanzantrieb (37), der mit einem Stanzkörper (33) verbunden ist, in die Stanzführung eingesetzt ist und darin gehalten wird, um sich frei auf und ab zu bewegen,
einen oberen Stanzantrieb (49), eingefügt in den Haltebund, um sich in einer treibenden Art frei auf und ab zu bewegen, wobei sich der Haltebund (77) integral mit dem oberen Stanzantrieb (49) dreht,
und wobei in der obigen Konfiguration der obere Stanzantrieb (49) und ein oberer Teil (37H) des unteren Stanzantriebs in einer aufwärts und abwärts einstellbaren Art ineinandergeschraubt sind.

2. Vorrichtung nach Anspruch 1, wobei
ein konkaver Eingreifbereich (81) in einer Nähe eines äußeren Umfangbereichs des Haltebunds (77) in einer peripheren Richtung bereitgestellt ist und
ein Verriegelungselement (73), das so vorgehalten wird, um frei mit dem konkaven Eingreifbereich (81) in Eingriff zu kommen und daraus ausgerückt zu werden, und das normalerweise in einem eingerückten Zustand ist, auf dem oberen Teil der Stanzführung (29) in einer diametrischen Richtung bereitgestellt ist, um sich frei zu bewegen.

Revendications

1. Dispositif d'emporte-pièce comprenant :

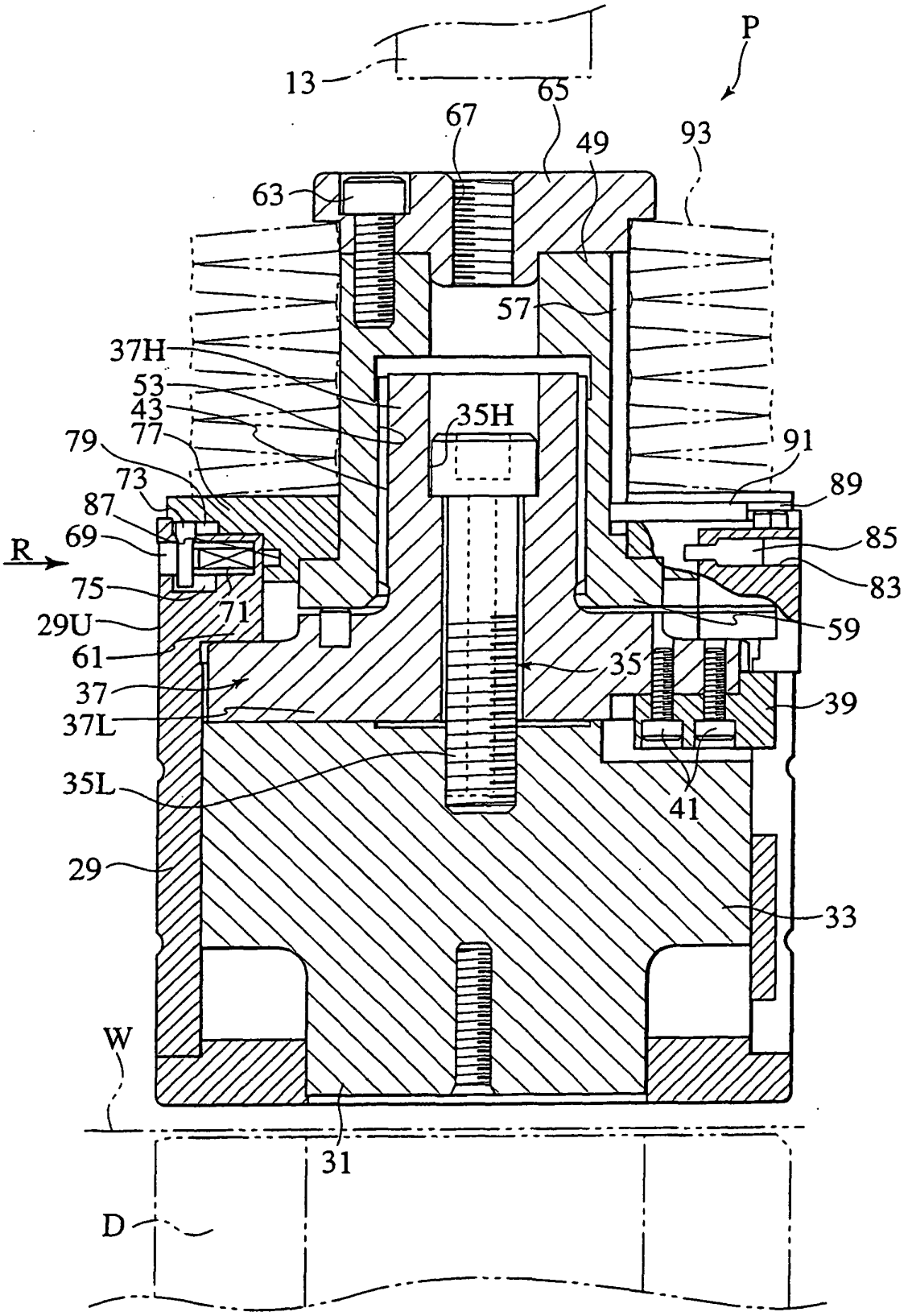
un collier de retenue (77) étant placé relativement sur une partie supérieure d'un guide de poinçon (29) de façon à être librement tourné et fixé, dans lequel un élément d'entraînement de poinçon inférieur (37) relié à un corps de poinçon (33) est monté et supporté dans le guide de poinçon de façon à se déplacer librement vers le haut et vers le bas ;
un élément d'entraînement de poinçon supérieur (49) inséré dans le collier de retenue de façon à se déplacer librement vers le haut et vers le bas d'une manière saillante;
le collier de retenue (77) tournant intégralement avec l'élément d'entraînement de poinçon supérieur (49) ;

dans lequel dans la configuration ci-dessus, l'élément d'entraînement de poinçon supérieur (49) et une partie supérieure (37H) de l'élément d'entraînement de poinçon inférieur sont vissés l'un dans l'autre d'une manière réglable en hauteur.

2. Dispositif de matrice selon la revendication 1, dans lequel :

une partie concave de prise (81) est placée au voisinage d'une partie périphérique extérieure du collier de retenue (77) dans une direction périphérique ; et
un élément de verrouillage (73), qui est maintenu de façon à venir en prise et hors de prise librement avec la partie concave de prise (81) et normalement dans un état en prise, est placé sur la partie supérieure du guide de poinçon (29) dans une direction diamétrale de façon à se déplacer librement.

FIG.1


P
13
65
67
49
93
63
57
37H
53
43
77
35H
79
91
73
89
87
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85
R
75
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59
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39
37L
35L
41
29
33
W
31
D

FIG.2

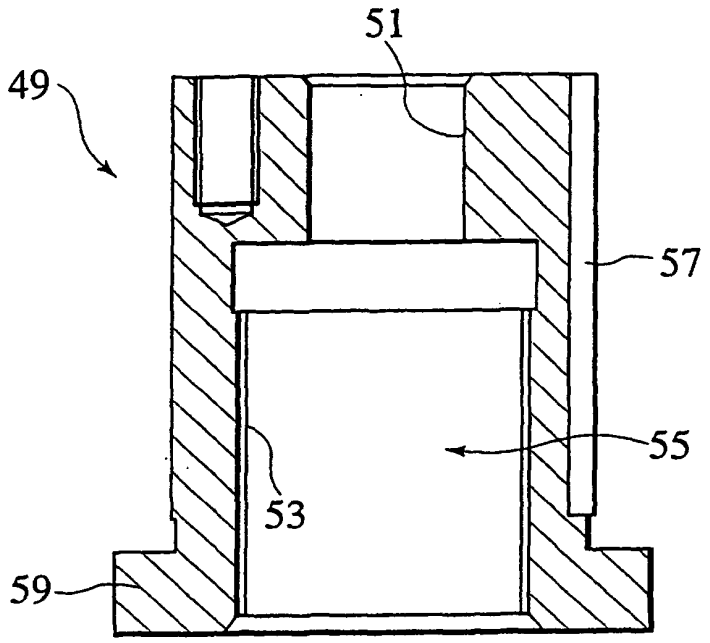


FIG.3

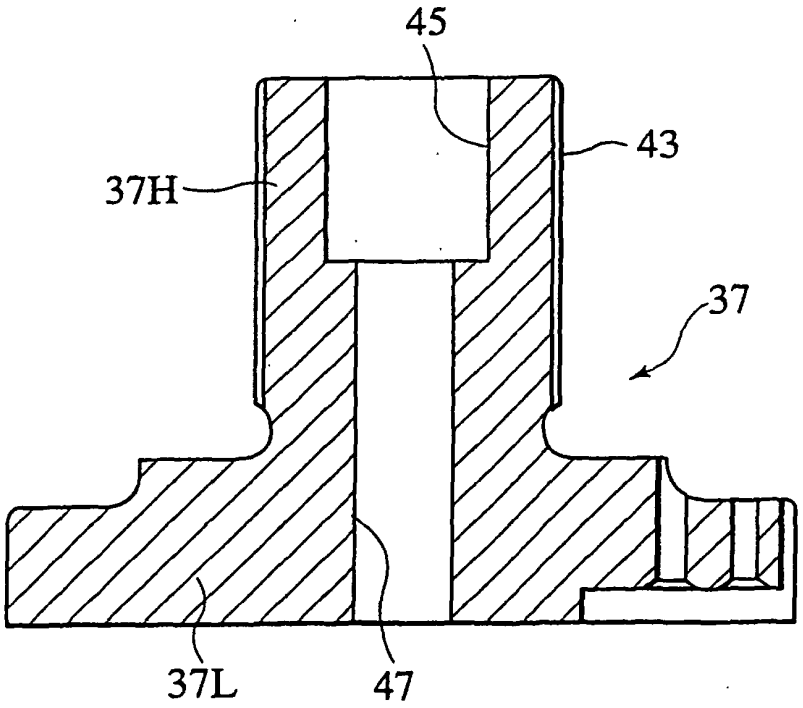


FIG.4

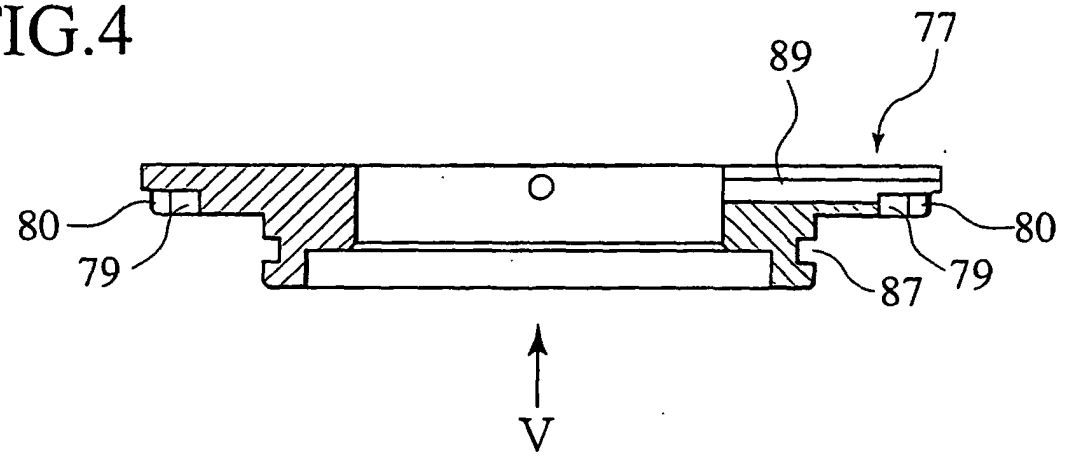


FIG.5

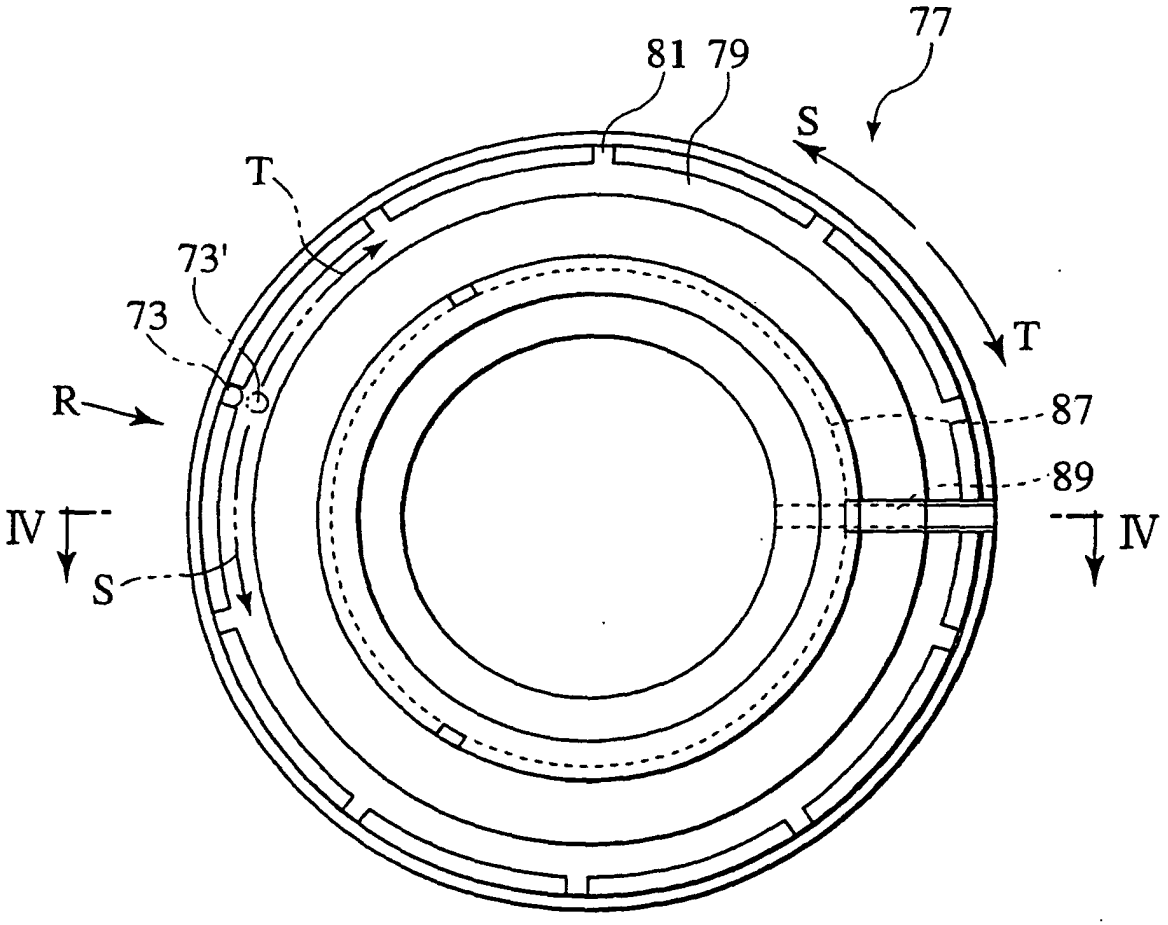


FIG.6

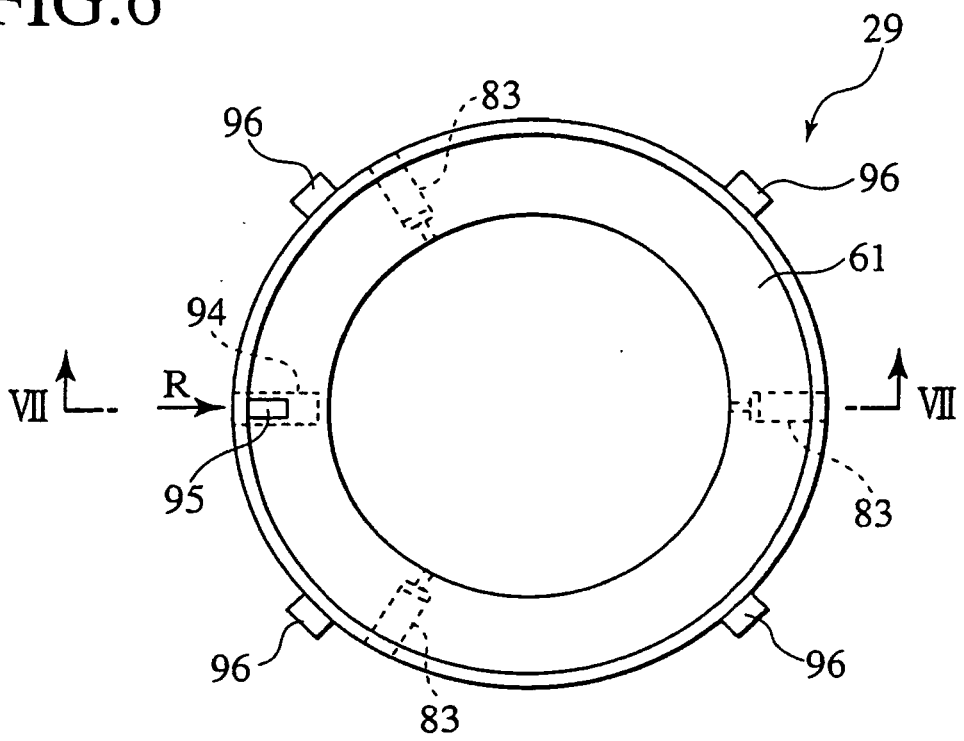
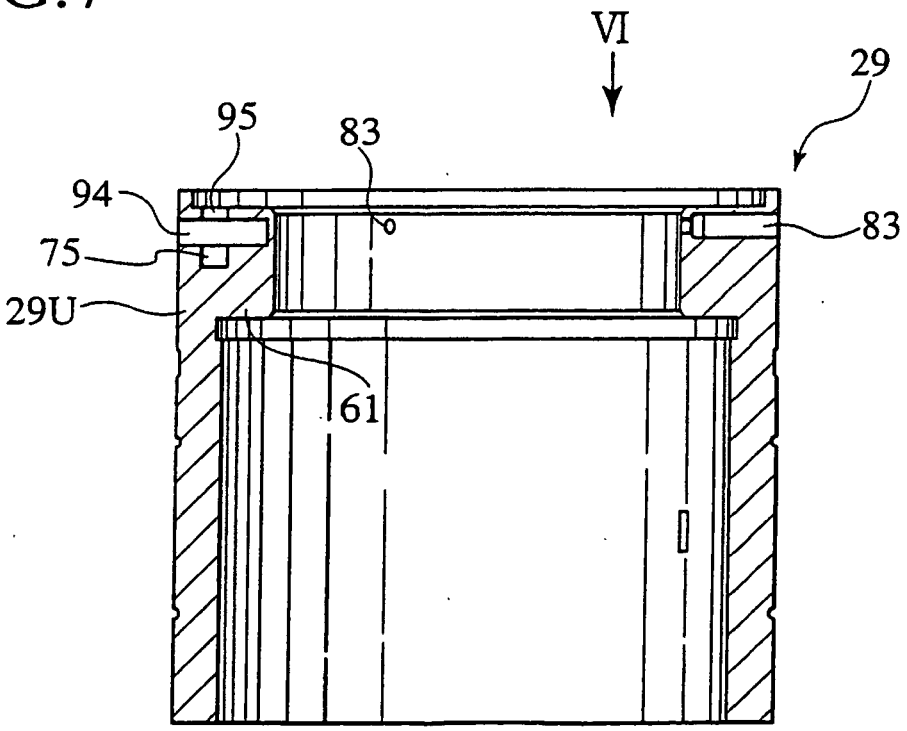


FIG.7



REFERENCES CITED IN THE DESCRIPTION

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- JP 2000288656 A **[0002] [0006]**
- JP 06000551 A **[0009]**